

What is claimed is:

1. A common-mode feedback circuit outputting a control voltage to define a common-mode operating point of a fully differential amplifier, comprising:

5 a voltage dividing circuit dividing a voltage across two output ends of said fully differential amplifier; and

a differential amplifier receiving an output voltage of said voltage dividing circuit and a  
10 reference voltage, wherein an output voltage of said differential amplifier is supplied as the control voltage to said fully differential amplifier.

2. The common-mode feedback circuit as claimed in claim 1, wherein said differential amplifier receives a  
15 midpoint voltage of said voltage dividing circuit and the reference voltage.

3. The common-mode feedback circuit as claimed in claim 1, wherein the output voltage of said differential amplifier is amplified or attenuated with an arbitrary  
20 sign.

4. The common-mode feedback circuit as claimed in claim 3, wherein the sign of an amplification factor of said differential amplifier is chosen so that a common-mode feedback system in said common-mode feedback circuit  
25 becomes a negative feedback system, based on a transfer function of an output common-mode voltage produced in response to said control voltage supplied to said fully differential amplifier.

5. The common-mode feedback circuit as claimed in claim 1, wherein said voltage dividing circuit comprises:  
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two impedance circuits dividing the voltage across said two output ends of said fully differential amplifier; and

one or more capacitive elements each  
35 connected between a fixed potential and a midpoint at which the voltage is divided by said impedance circuits.

6. The common-mode feedback circuit as claimed in

claim 5, wherein said voltage dividing circuit further comprises a capacitive element connected between a low voltage supply line and the midpoint at which the voltage is divided by said impedance circuits.

5           7. The common-mode feedback circuit as claimed in claim 5, wherein said voltage dividing circuit further comprises a capacitive element connected between a high voltage supply line and the midpoint at which the voltage is divided by said impedance circuits.

10           8. The common-mode feedback circuit as claimed in claim 5, wherein each of said impedance circuits comprises a resistive element and a capacitive element connected in parallel.

15           9. The common-mode feedback circuit as claimed in claim 5, wherein said impedance circuit has a configuration equivalent to said voltage dividing circuit, and is inserted between said differential amplifier and an input end of the reference voltage.

20           10. The common-mode feedback circuit as claimed in claim 5, wherein said impedance circuit is configured to exhibit an impedance equivalent to the impedance of said voltage dividing circuit, and is inserted between said differential amplifier and an input end of the reference voltage.

25           11. The common-mode feedback circuit as claimed in claim 5, wherein a first pole in a common-mode loop transfer function is dominantly caused by a pole attributable to said impedance circuits and said capacitive element in said voltage dividing circuit.

30           12. The common-mode feedback circuit as claimed in claim 5, wherein a first zero in a common-mode loop transfer function is dominantly caused by a zero attributable to said voltage dividing circuit, and is located in the vicinity of or on a low frequency side of a unity gain frequency.

35           13. The common-mode feedback circuit as claimed in claim 1, wherein said differential amplifier comprises a

differential pair and an active load, and a voltage that said active load outputs is supplied as the control voltage to said fully differential amplifier.

5 14. A differential operational amplifier circuit comprising a fully differential amplifier, and a common-mode feedback circuit outputting a control voltage to define a common-mode operating point of said fully differential amplifier, wherein said common-mode feedback circuit comprising:

10 a voltage dividing circuit dividing a voltage across two output ends of said fully differential amplifier; and

a differential amplifier receiving an output voltage of said voltage dividing circuit and a  
15 reference voltage, wherein an output voltage of said differential amplifier is supplied as the control voltage to said fully differential amplifier.

15 15. The differential operational amplifier circuit as claimed in claim 14, wherein said differential amplifier receives a midpoint voltage of said voltage dividing circuit and the reference voltage.

20 16. The differential operational amplifier circuit as claimed in claim 14, wherein the output voltage of said differential amplifier is amplified or attenuated  
25 with an arbitrary sign.

17. The differential operational amplifier circuit as claimed in claim 16, wherein the sign of an amplification factor of said differential amplifier is  
30 chosen so that a common-mode feedback system in said common-mode feedback circuit becomes a negative feedback system, based on a transfer function of an output common-mode voltage produced in response to said control voltage supplied to said fully differential amplifier.

35 18. The differential operational amplifier circuit as claimed in claim 14, wherein said voltage dividing circuit comprises:

two impedance circuits dividing the

voltage across said two output ends of said fully differential amplifier; and

one or more capacitive elements each connected between a fixed potential and a midpoint at which the voltage is divided by said impedance circuits.

19. The differential operational amplifier circuit as claimed in claim 18, wherein said voltage dividing circuit further comprises a capacitive element connected between a low voltage supply line and the midpoint at which the voltage is divided by said impedance circuits.

20. The differential operational amplifier circuit as claimed in claim 18, wherein said voltage dividing circuit further comprises a capacitive element connected between a high voltage supply line and the midpoint at which the voltage is divided by said impedance circuits.

21. The differential operational amplifier circuit as claimed in claim 18, wherein each of said impedance circuits comprises a resistive element and a capacitive element connected in parallel.

22. The differential operational amplifier circuit as claimed in claim 18, wherein said impedance circuit has a configuration equivalent to said voltage dividing circuit, and is inserted between said differential amplifier and an input end of the reference voltage.

23. The differential operational amplifier circuit as claimed in claim 18, wherein said impedance circuit is configured to exhibit an impedance equivalent to the impedance of said voltage dividing circuit, and is inserted between said differential amplifier and an input end of the reference voltage.

24. The differential operational amplifier circuit as claimed in claim 18, wherein a first pole in a common-mode loop transfer function is dominantly caused by a pole attributable to said impedance circuits and said capacitive element in said voltage dividing circuit.

25. The differential operational amplifier circuit as claimed in claim 18, wherein a first zero in a common-

mode loop transfer function is dominantly caused by a zero attributable to said voltage dividing circuit, and is located in the vicinity of or on a low frequency side of a unity gain frequency.

5           26. The differential operational amplifier circuit as claimed in claim 14, wherein said differential amplifier comprises a differential pair and an active load, and a voltage that said active load outputs is supplied as the control voltage to said fully  
10 differential amplifier.